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Jc923 U.S. PTO

**UTILITY
PATENT APPLICATION
TRANSMITTAL**

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.

35.C14864

First Named Inventor or Application Identifier

SHUMPEI TAKENAKA ET AL.

Express Mail Label No.

Jc582 U.S. PTO
09/685737**APPLICATION ELEMENTS**

See MPEP chapter 600 concerning utility patent application contents

ADDRESS TO:Commissioner for Patents
Box Patent Application
Washington, DC 202311. ☒ Fee Transmittal Form
(Submit an original, and a duplicate for fee processing)2. ☐ Applicant claims small entity status.
See 37 CFR 1.27.3. ☒ Specification *Total Pages* 4. ☒ Drawing(s) (35 USC 113) *Total Sheets* 5. ☐ Oath or Declaration *Total Pages* a. ☐ Newly executed (original or copy)b. ☐ Copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 17 completed)
[Note Box 6 below]i. ☐ **DELETION OF INVENTOR(S)**
Signed Statement attached deleting inventor(s)
named in the prior application, see 37 CFR
1.63(d)(2) and 1.33(b)6. ☒ Application Data Sheet. See 37 CFR 1.767. ☐ CD-ROM or CD-R in duplicate, large table or Computer
Program (Appendix)8. ☐ Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)a. ☐ Computer Readable Form (CRF)

b. Specification Sequence Listing on:

i. ☐ CD-ROM or CD-R (2 copies); orii. ☐ paperc. ☐ Statements verifying identity of above copies**ACCOMPANYING APPLICATION PARTS**9. ☐ Assignment Papers (cover sheet & document(s))10. ☐ 37 CFR 3.73(b) Statement ☐ Power of Attorney
(when there is an assignee)11. ☐ English Translation Document (if applicable)12. ☐ Information Disclosure ☐ Copies of IDS
Statement (IDS)/PTO-1449 Citations13. ☐ Preliminary Amendment14. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)16. ☐ Other: _____

17 If a CONTINUING APPLICATION, check appropriate box and supply the requisite information:

☐

Continuation

☐

Divisional

☐

Continuation-in-part (CIP)

of prior application No. ____/____

Prior application information:

Examiner _____

Group/Art Unit: _____

For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts

18 CORRESPONDENCE ADDRESS☒

Customer Number or Bar Code Label

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CLAIMS	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
	TOTAL CLAIMS (37 CFR 1.16(c))	14-20 =	0	X \$ 18.00 =	\$0
	INDEPENDENT CLAIMS (37 CFR 1.16(b))	8-3 =	5	X \$ 80.00 =	\$400.00
	MULTIPLE DEPENDENT CLAIMS (if applicable) (37 CFR 1.16(d))			\$270.00 =	\$0
				BASIC FEE (37 CFR 1.16(a))	\$710.00
			Total of above Calculations =		\$1110.00
	Reduction by 50% for filing by small entity (Note 37 CFR 1.9, 1.27, 1.28).				0
	TOTAL =				\$1110.00

19. Small entity status

- a. ☐ A small entity statement is enclosed
- b. ☐ A small entity statement was filed in the prior nonprovisional application and such status is still proper and desired.
- c. ☐ Is no longer claimed.

20. ☒ A check in the amount of \$ 1110.00 to cover the filing fee is enclosed.

21. ☐ A check in the amount of \$ _____ to cover the recordal fee is enclosed.

22. The Commissioner is hereby authorized to credit overpayments or charge the following fees to Deposit Account No. 06-1205:

- a. ☒ Fees required under 37 CFR 1.16.
- b. ☒ Fees required under 37 CFR 1.17.
- c. ☐ Fees required under 37 CFR 1.18.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

NAME	Jack M. Arnold
SIGNATURE	<i>Jack M. Arnold Reg. No. 25,823</i>
DATE	October 10, 2000

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100																																																																																																																																																																																																	
Population, million	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	31.0	31.1	31.2	31.3	31.4	

CORRESPONDENCE INFORMATION

APPLICATION INFORMATION

Total Drawing Sheets:: 9
Formal Drawings?: Yes
Application Type:: Utility
Docket Number:: 35.C14864
Secrecy Order in Parent Appl.?: No

Representative Customer Number:: 5514

Foreign Application One:: 11-289375
Filing Date:: 12, October, 1999
Country:: Japan
Priority Claimed:: Yes

IMAGE PROCESSING APPARATUS AND METHOD THEREFOR

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to an image
processing apparatus for efficiently arranging and
printing, on a designated sheet, all the image data or
selected ones thereof, obtained by a device such as a
digital camera or the like and stored in a memory
10 medium, and an image processing method and a memory
medium adapted for use therefor.

Related Background Art

 In case of printing plural images on a printing
sheet by designating division therein in a conventional
15 printing apparatus, the number of printed images, the
printing positions and the printing areas are defined
as invariable values, so that the sheet and the images
to be printed are designated in the unit of each sheet.

 Also in such conventional printing apparatus, in
20 case of printing plural desired images on a printing
sheet, the images are printed as a size according to
the sheet size, so that the magnification of the images
varies according to the sheet size and it is not
possible to print the desired image with the desired
25 size on the sheet.

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SUMMARY OF THE INVENTION

In consideration of the foregoing, the image processing apparatus of the present invention is characterized by designation means for designating the size of the image to be printed on the sheet, and process means for executing a process of printing the image designated by the designation means.

The image processing apparatus of the present invention is also characterized by designation means for designating the image size to be printed on the sheet and means for executing a layout process for the sheet with the image size designated by the designation means.

The image processing apparatus of the present invention is also characterized by designation means for designating the sizes of the images to be printed on a page, means for designating the number of images, and process means for editing and printing, on a page, with a layout based on the images according to the designation by the designation means.

The image processing apparatus of the present invention is also characterized by designation means for designating the images to be printed and the partition of the images for changing the page, and process means adapted, in printing the images designated by the designation means, to execute a page changing process upon detection of the partition of the

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images designated by the designation means.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram of a control apparatus
5 for an electronic image;

Fig. 2 is a flow chart showing an example of
printing control;

Fig. 3 is a flow chart showing an example of
printing control with priority on the number of images;

10 Fig. 4 is a flow chart showing printing control in
case the image size and the number of images are both
designated;

Fig. 5 is a flow chart for a condition setting 1;

Fig. 6 is a flow chart for a condition setting 2;

15 Fig. 7 is a flow chart for a condition setting 3;

Fig. 8 is a flow chart for a condition setting 4;

Figs. 9A and 9B are respectively a block diagram
and an external view of a digital camera;

Fig. 10 is a flow chart for condition setting with
20 the digital camera; and

Figs. 11A, 11B and 11C are views showing example
of images printed on a sheet.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

25 Now the present invention will be explained by
embodiments thereof, with reference to the accompanying
drawings.

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Fig. 1 is a block diagram of a control apparatus for an electronic image. As an external memory device 2, a non-volatile memory medium can be chosen as an example. An external memory device 2 is detachably mountable on a digital camera and also on the present control apparatus, and stores the image data taken for example by the digital camera as an image file. The above-mentioned non-volatile memory medium may also contain a print object designation/condition file for defining the print object image and the print condition such as the printing sheet. Also instead of employing the detachable memory medium, the control apparatus in the present invention may incorporate a memory device for storing a file transferred directly from the digital camera or through a memory medium.

The image designation for arranging images on a sheet is executed from an input part 6. Such image designation includes the setting of various conditions for example of designation of a sheet size such as B4, A4, B5 or A5, that of a print sheet size such as a whole sheet, a half sheet, a quarter sheet or a sixth sheet of the newspaper size, number of image divisions per printing sheet or image size (represented by sheet size or by image dimension), the designation of an appropriate layout mode. When the image signal is selected and designated, the number thereof is from time to time stored in an image printing object

register area 8A in a memory 8, and the number of an
image counter area 8B in the memory 8 is at the same
time increased by one and is newly stored in a total
image number register 8C therein. Then, as a condition
5 for arranging and printing plural images on a page, a
partition number for designating the number of
divisions or the number of images to be arranged on a
page is entered manually from the input part 6 and is
stored in a partition number register 8D of the memory
10 8. Similarly the desired number of sheets is stored in
a page number register 8E in the memory 8, and the
desired print sheet size is stored in a page size
register 8F. Also the desired image size is stored in
an output image size register 8G.

15 A partition number register 8D in the memory 8
stores a number of additional images and a condition of
layout permissible in case of maintaining the printed
image size, determined from the sheet and the partition
number, and the minimum distance of the images, by
20 referring to a partition table based on the maximum
partition layout condition and the partition number at
the completion of sheet setting. A decode/distribution
process distributes and stores, in case an external
memory device 2 (for example a non-volatile memory
25 medium storing image data) contains an image to be
printed and a condition designating file corresponding
to the image, the results of decoding of such content

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in the total image number register 8C, the image printing object register 8A, the partition number register 8D, the page number register 8E, the page size register 8F and the output image size register 8G. An image decode/decompression process executes decoding of the compressing condition of data compressed for example by JPEG and decompression of the data. Pixel information 18 obtained by the image decode/decompression part 3 is supplied to a central processing unit (CPU) 1, and the layout condition is determined from the print output size and the output resolution, by referring to the areas in the memory 8, namely the total image number register 8C, the image printing object register 8A, the partition number register 8D, the page number register 8E, the sheet size register 8F and the output image size register 8G. A printing device 5 converts the image data, decompressed according to the result of the CPU 1, into print data matching the printing apparatus and transfers such print data thereto. For calculating the layout condition, the CPU 1 acquires and stores in advance various conditions relating to the print layout such as the printable area, through a print control part. Programs corresponding to the flow charts shown in Figs. 2 to 8 are stored in a read-only memory (ROM) of a memory 7 shown in Fig. 1, and are executed by the CPU. The programs stored in the ROM may be stored in

another memory medium or may be loaded from an external memory into an internal memory.

In the embodiment of the present invention, in a printing apparatus provided with means for entering
5 image number information etc. for specifying the image data stored in the non-volatile memory medium, a control part for decoding and decompressing the image data, a control part for printing the image data and decoding means for the non-volatile memory medium
10 storing the print object and condition designating file prepared in advance by image designating means outside the present apparatus for example that of a digital camera, the print object image information obtained by an input of the print object image number or by
15 decoding the print object and condition designating file is stored in a specified memory part of the apparatus, and the images designated by thus stored information are arranged in succession on the printing sheet according to the image layout condition of the
20 designated sheet whereby the printing with automatic page change is continued until all the images are printed.

At first reference is made to Fig. 5 for explaining a first condition setting process for
25 designating an image.

At first, in a step S11, an image to be designated is entered manually from the input part 6. Then a step

S12 stores the total number of the designated images in the total image number register 8C. Then a step S13 stores the image number of the image designated by the input part 6 in the image printing object register 8C.

5 Then reference is made to Fig. 6 for explaining a second condition setting process for designating the sheet size.

10 At first, in a step S21, an input on the sheet to be designated is entered from the input part 6. Then a step S22 stores the sheet size entered from the input part 6 in the sheet size register 8F.

 Then reference is made to Fig. 7 for explaining a third condition setting process for designating the partition number.

15 At first, in a step S31, a partition number is manually entered from the input part 6. Then a step S32 stores the partition number, entered from the input part 6, in the partition number register 8D.

20 Then reference is made to Fig. 8 for explaining a fourth condition setting process for designating an image size.

25 At first, in a step S41, an image size is entered from the input part 6. Then a step S42 stores the image size entered from the input part 6 in the image size register 8G.

 In the following there will be explained, with reference to Fig. 2, a process in case the printing is

instructed by the user after the aforementioned first to fourth condition settings. Each condition setting is achieved either automatically or by entering a numerical condition. The automatically set condition becomes lower in priority in case another condition is entered by the numerical value.

In the following there will be explained a case where the image is to be outputted with a desired size on the sheet or the number of images to be outputted on the sheet is designated while the image size is automatically set.

At first, in step S1801, it is checked whether a plural images on the output sheet are arranged or not. If "NO" in step S1801, an image read from the file is output to an image layout register for outputting an image with the designated image size on the sheet in step S1812 as shown in Fig. 11B. On the other hand, if "YES" in step S1801, the sequence proceeds to step S1802 for discriminating whether the priority is given to the image size and the number of images is automatically set. If the priority is given to the image size, the sequence proceeds to step S1803 for setting "1" in a register N. Then step S1804 checks whether the images of a number of the register N can be accommodated in the sheet. If affirmative, step S1805 transfers an image Gn from the file into the image layout register, and next step S1806 checks whether a

next image G_{n+1} is present. If not, step S1811 sends an image layout storing the images up to the image G_{n+1} to the printing apparatus and executes output on the output sheet as shown in Fig. 11A. If affirmative, a
5 process for adding $N+1$ into N ($N = N+1$) is executed in step S1807, and it is checked whether the image G_n is added to the image layout on the sheet in step S1808. That is, there is checked, from the sheet size and the image size, whether the plural images can be laid on
10 the sheet. If the result is negative, the images up to G_{n+1} stored in the image layout register is output to the printing sheet in step S1809. If the result in the step S1804 is negative, step S1810 executes output to the image layout register by reducing the output size
15 on the sheet, and then to the printing apparatus for printing as shown in Fig. 11C. Then there is executed a process $N = N+1$ on the register N , and the sequence returns to step S1804.

In case step S1802 identifies that the priority is
20 given to the image size and the number of images is not automatically set, the sequence proceeds to the flow chart shown in Fig. 3, wherein step S1901 discriminates whether the priority is given to the number of images and the image size is automatically set.

25 If affirmative, step S1902 checks the sheet size, then stores the designated number of images in the image layout register of the memory 8 according to a

template, and then the images are printed on the output
sheet (S1903). Then there is searched, in the memory
medium of the external memory device, whether a next
image is present (S1904). If present, the sequence
5 returns to step S1902, but, if not, the sequence is
terminated.

If the result of step S1901 is negative, the
sequence proceeds to the flow chart shown in Fig. 4.

In step S2001, it is checked whether the image
10 size and the number of images are both designated. If
the both designations are absent, the sequence is
terminated, but, if they are present, the sequence
proceeds to step S2002 for discriminating whether the
designated output is possible on the sheet. If the
15 designated output is possible, there are executed the
output of a sheet (step S2007) and a page change
process for proceeding to a next sheet (step S1008).
On the other hand, if the designated output is not
possible, an image is arranged with priority on the
20 image size in step S2003. Then step S2004
discriminates whether at least an image can be placed.
If possible, there is executed output (step S2005),
but, if not, there is executed output with a reduction
in the size (step S2009). Then step S2006 checks
25 whether a next image is present. If absent, the
sequence is terminated, but, if present, the sequence
returns to step S2001 for repeating the above-described

procedure.

Fig. 9A is a block diagram of a digital camera 100 shown in Fig. 9B, wherein an input part 101 is used for designating the setting of mode etc. A processing part 102 includes a CPU 1021, a ROM 1022, and a RAM 1023. The ROM 1022 stores the procedure shown in Fig. 10. The RAM 1023 stores an image fetched by the input means in correlation with the image size designated by the designation means for designating the image size. The RAM 1023 corresponds to the memory 8 shown in Fig. 1. An image is taken from an input part 101 or an image pickup part, and the image and the attribute information defined therefor are stored through an external memory device 104. Such external memory device 104 corresponds to the external memory device 2 shown in Fig. 1.

At first the taken image is displayed on a display device 103. Then, according to a program of the ROM 7, there are entered, from the input part 101, the size of the image to be outputted and the instruction for example for executing or not the printing. Fig. 10 shows the process flow to be executed by the CPU for defining the image size (large (L), medium (M) or small (S)) for the image. The display device 103 displays the image, and, in such display state, the image size for such image is entered from the input part (steps S2101, S2111, S2121). The image and the image size

In the foregoing embodiment, the image control apparatus for executing the image control can be a digital camera, a computer or an image printing order receiving processing device (i.e. printer).

The present invention allows to obtain the print result desired by the user with the designation of the image size, in contrast to the conventional method in which the image designation and the printing operation have to be repeated in the unit of each page. Consequently it is rendered possible to executing the printing without size designation at the printing operation, and, as the output size can also be designated on the displayed image instead of on the printing, the image can be reproduced with the desired size on the display, so that the image can be rendered visible in the desired size, in a simpler manner than in the conventional technology.

WHAT IS CLAIMED IS:

1. An image processing apparatus comprising:
designating means for designating the image size
of an image to be printed on a sheet; and
5 process means for executing a page change process
for each layout of the image size designated by said
designating means.

2. An image processing apparatus according to
10 claim 1, further comprising printing means for printing
an image.

3. An image processing apparatus comprising:
designating means for designating the size of
15 images to be printed on a page;
designating means for designating the number of
images to be printed on a page; and
process means for executing a process of printing
images on a page according to the designation by either
20 of said designating means.

4. An image processing apparatus according to
claim 3, further comprising printing means for printing
said images.

25

5. An image processing method comprising:
a step of designating the image size of an image

to be printed on a sheet; and

a process step of executing a page change process for each layout of the image size designated by said designation step.

5

6. An image processing method according to claim 5, further comprising a printing step of printing an image.

10

7. A memory medium comprising:

a step of storing the image size of an image to be printed on a sheet, designated by designation means; and

15

a process step of executing a page change process for each layout of the image size designated by said storing step.

8. A memory medium comprising:

20

a memory step of storing the image size of images to be printed on a page, designated by designation means;

a memory step of storing the number of images to be printed on a page, designated by designation means; and

25

a process step of executing a process of layout of images on a page based on the image size or the number of images stored in either of the foregoing steps.

9. An image processing apparatus comprising:
image fetching means for fetching an image;
designation means for designating the size of the
image to be printed on a sheet; and

5 memory control means for storing, in mutual
correlation, the image fetched by said image fetching
means and the image size designated by said designation
means.

10 10. An image processing apparatus according to
claim 9, wherein said image fetching means includes
image pickup means for taking an image.

11. An image processing apparatus according to
15 claim 10, wherein said image fetching means is adapted
to fetch the image taken by said image pickup means
through a memory medium.

12. An image processing apparatus according to
20 claim 11, wherein said memory medium is detachable.

13. An image processing apparatus comprising:
 designation means for designating the image size
 of the image to be outputted; and
 25 process means for executing a page change process
 for each layout with the image size designated by said
 designation means.

5

ABSTRACT OF THE DISCLOSURE

5 In conventional printing apparatus, in case of printing plural desired images on a printing sheet, the images are printed as a size according to the sheet size, so that the magnification of the images varies according to the sheet size and it is not possible to printing the desired image with the desired size on the sheet.

10 In order to solve the foregoing problem, it is provided, an apparatus for designating the size of an image to be printed on a sheet, arranging images on a sheet.

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FIG. 1

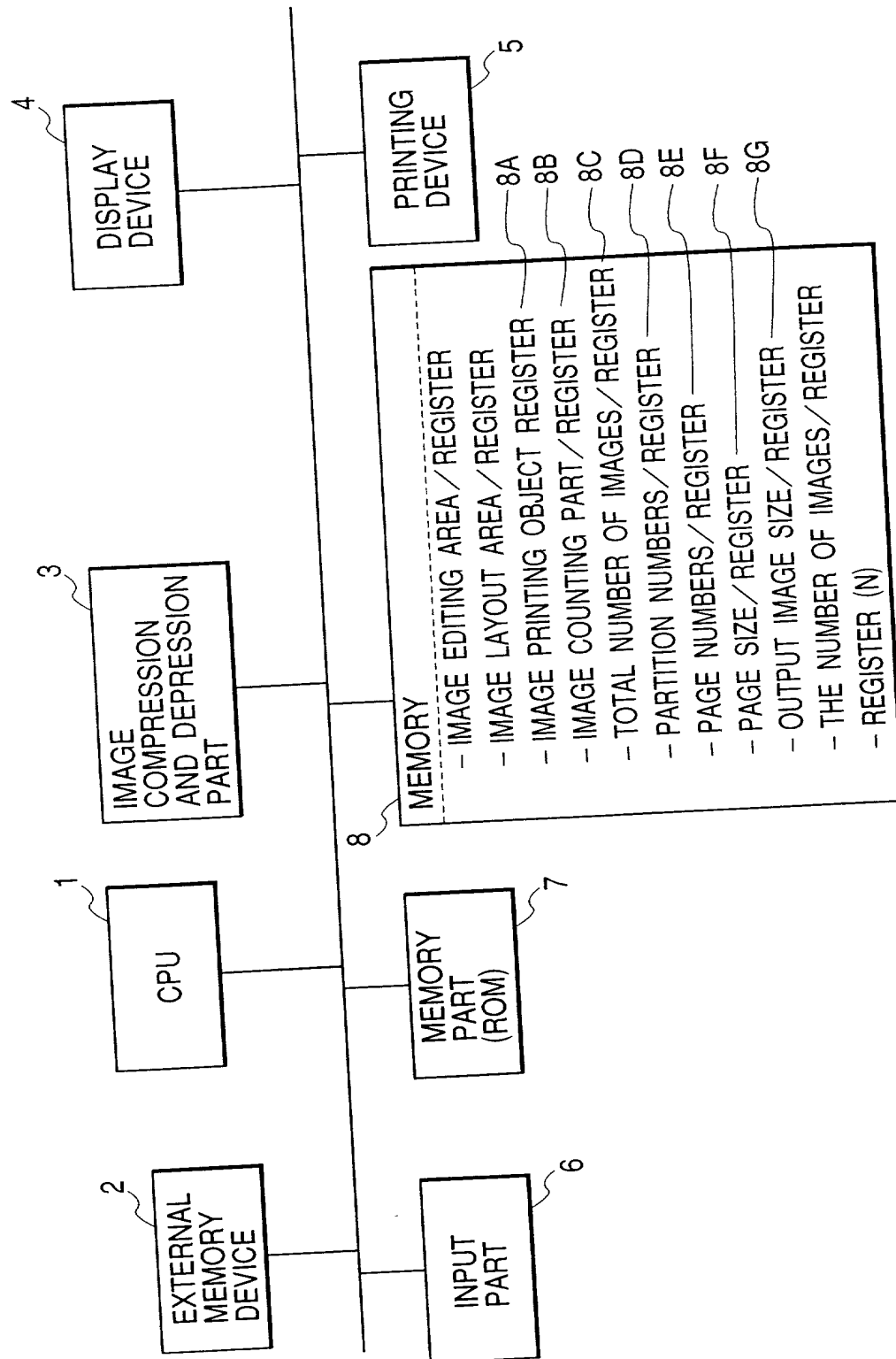


FIG. 2

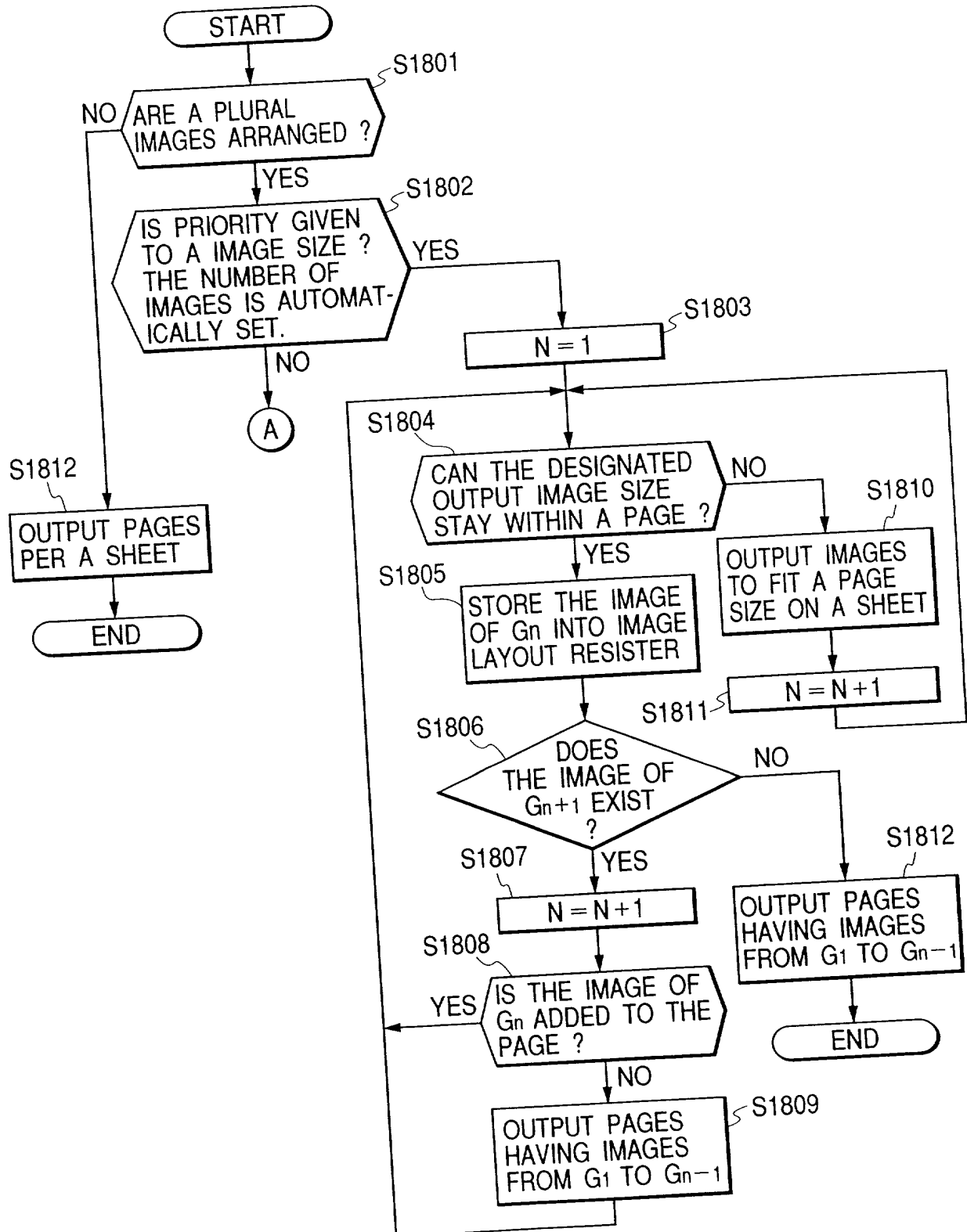


FIG. 3

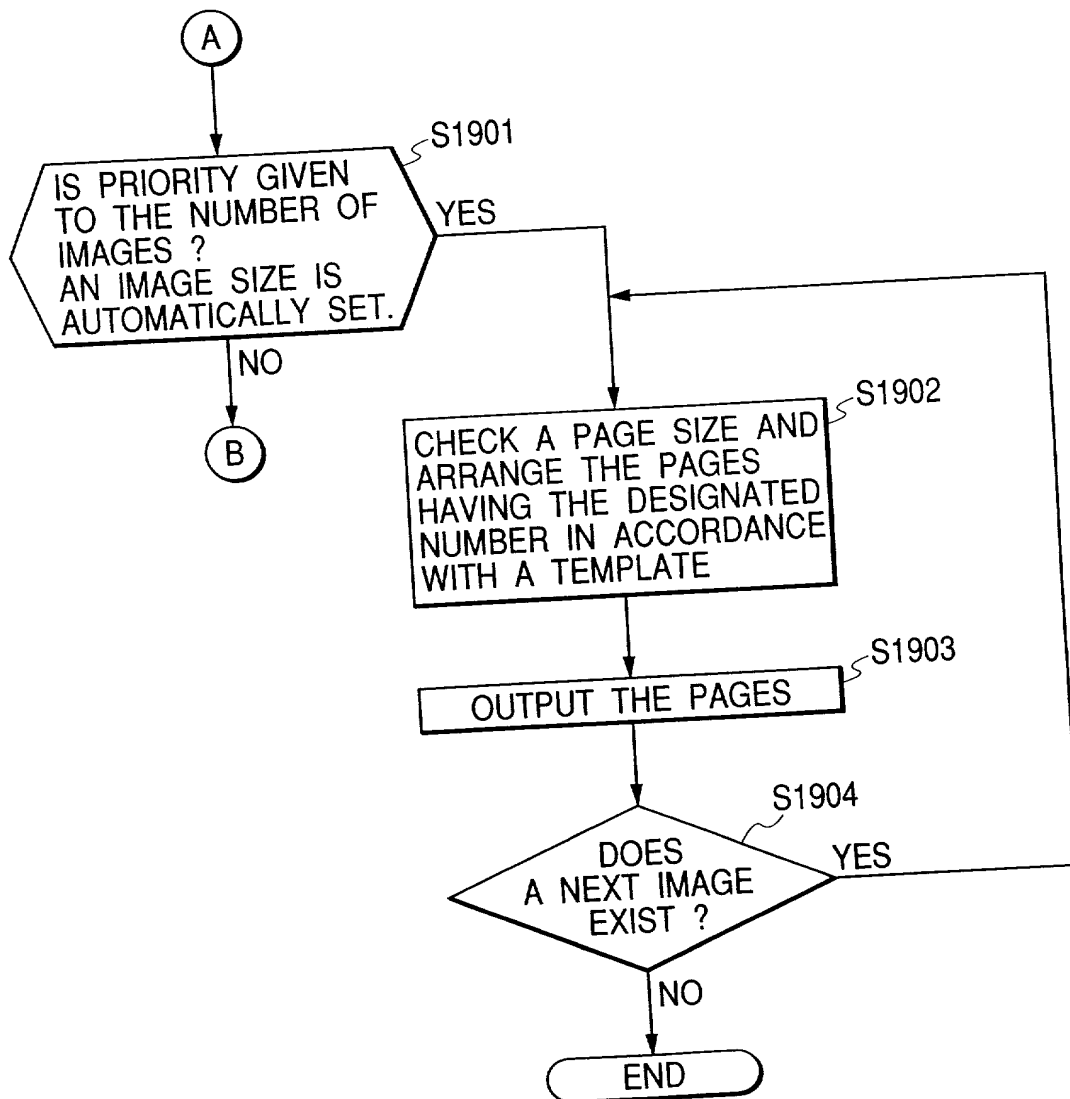


FIG. 4

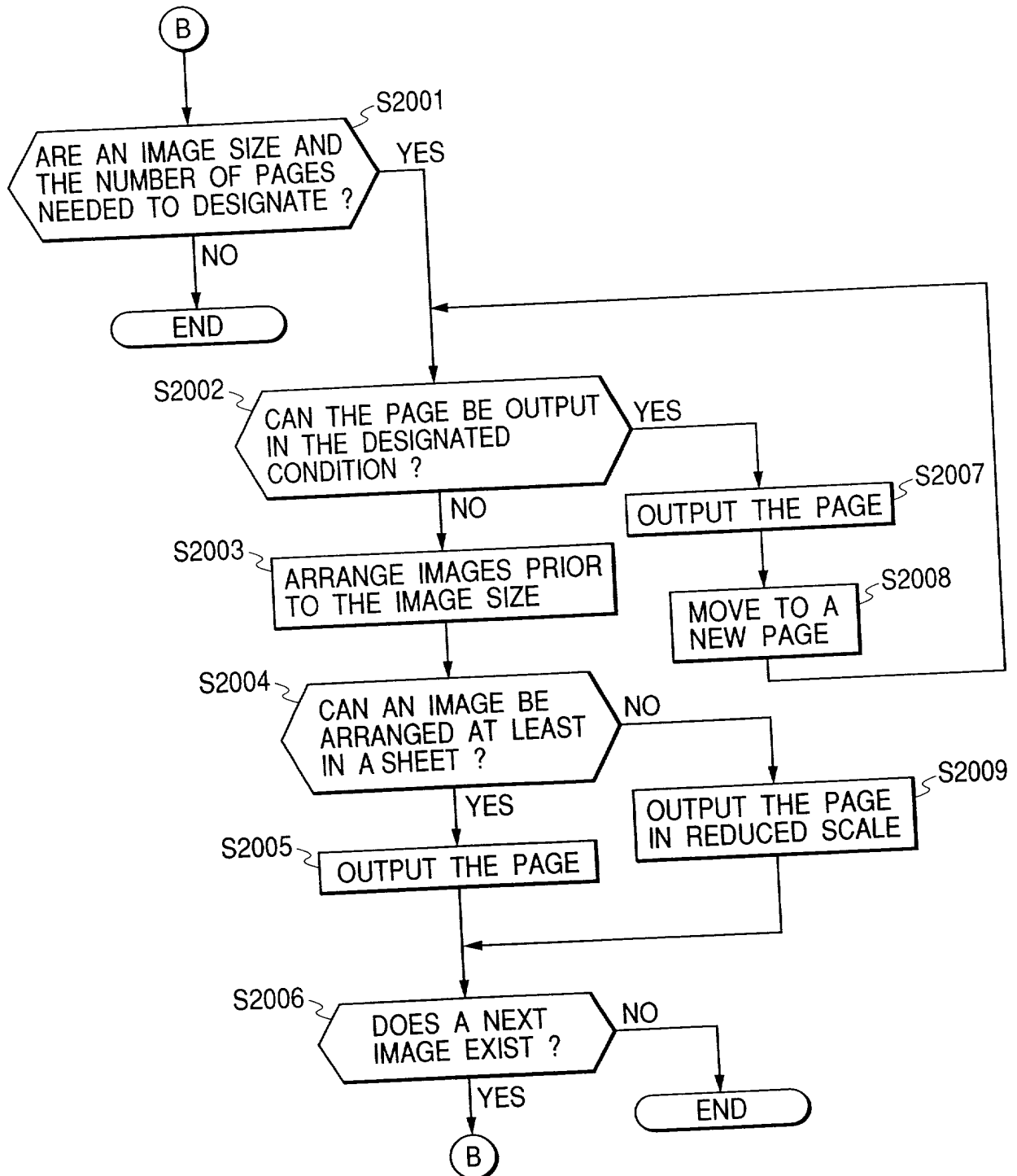


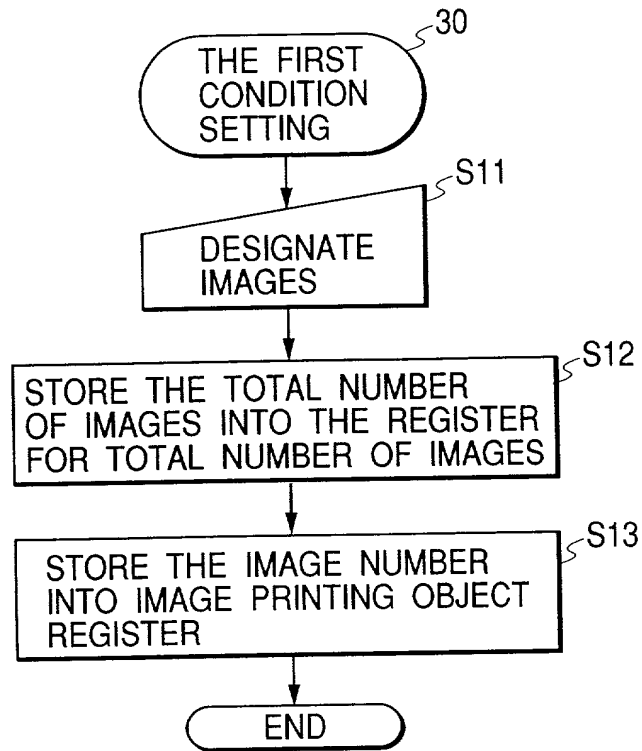
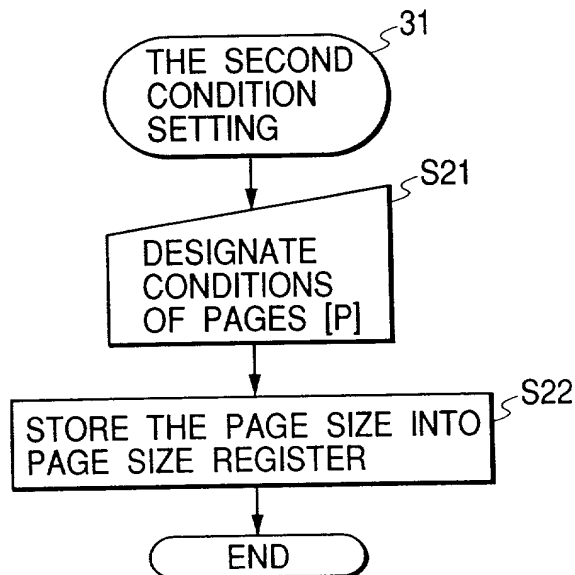
FIG. 5**FIG. 6**

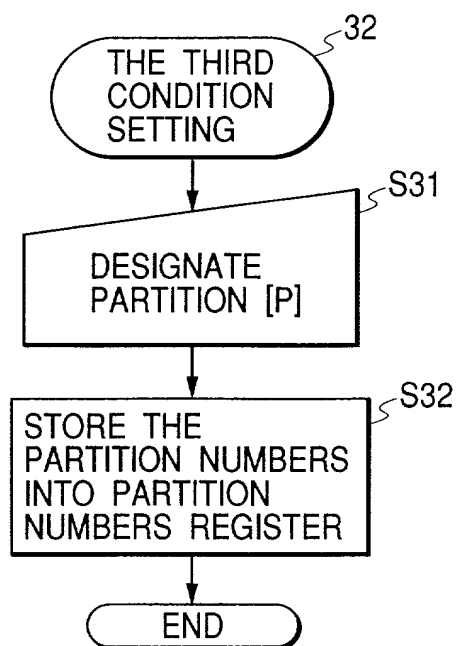
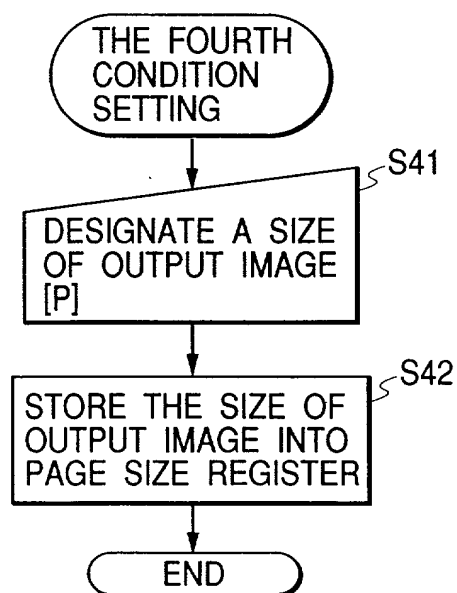
FIG. 7*FIG. 8*

FIG. 9A

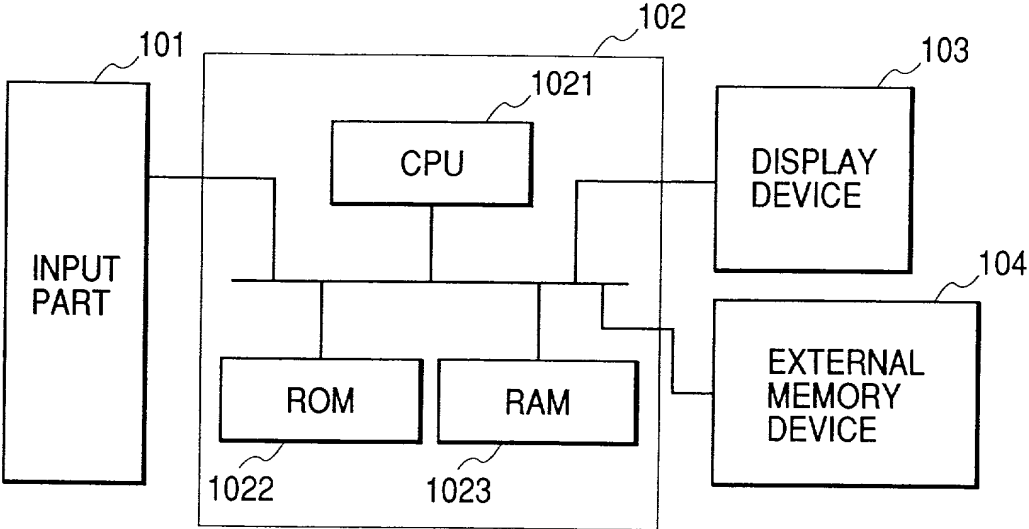


FIG. 9B

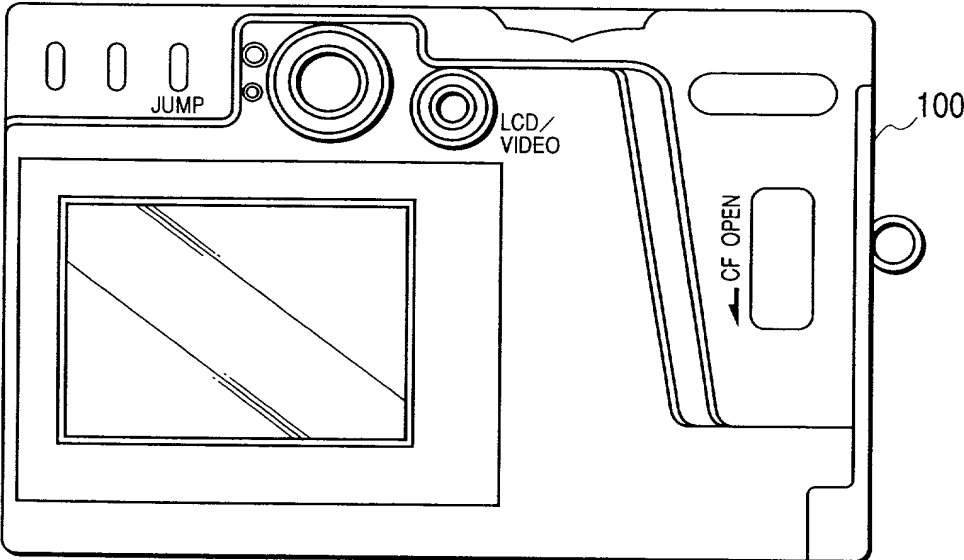


FIG. 11B

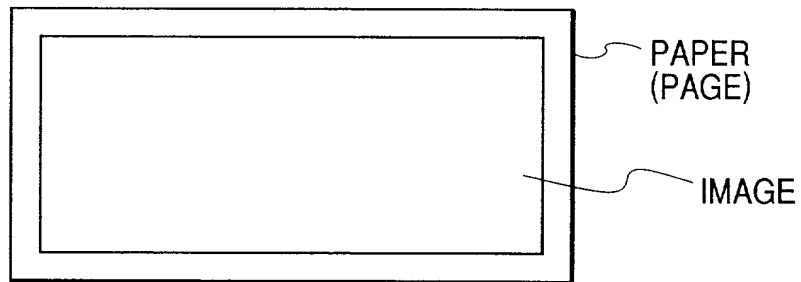


FIG. 11C

